



Left Inverted Terminal Repeat: 1-103

Encapsidation Signal (Ψ): 183-331

HPRT Introns: 365-10557

Right Inverted Terminal Repeat:
10571-10673

pBR322 ori: 10877-11544

Kanamycin Resistance Gene: 12353-
13144

FIG. 1

SEQ ID NO:1 pSHuttle Sequence

CATCATCAATAATATACCTTATTTTGGATTGAAGCCAATATGATAATGAGGGGGTGGAGTTTGTGACG
TGGCGCGGGGCGTGGAACGGGGCGGGTGACGTAGTAGTGTGGCGGAAGTGTGATGTTGCAAGTGTG
GCGGAACACATGTAAGCGACGGATGTGGCAAAAGTGACGTTTTTGGTGTGCGCCGGTGTACACAGGA
AGTGACAATTTTCGCGCGGTTTTAGGCGGATGTTGTAGTAAATTTGGGCGTAACCGAGTAAGATTTGG
CCATTTTCGCGGGA AAACTGAATAAGAGGAAGTGAAATCTGAATAATTTTGTGTTACTCATAGCGCGT
AATACTGGTACCGCGGCCCGCTCGAGTCTAGAAGTGTGGATCCCCCGGGCTGCAGGAATTCTGATGG
CTCTCAAAATTCCTGCCTCCTTTAGGGATAAAAAGACTTTAAGACTTTTTAACAAAAAAGAAAAAGAAA
AAAAAAATTCCTGCCTCCTGGTGTACACACACAGAAGGGTTCCCTCCCCTTGAATGTGACCAGGATCT
GTGAAAATAACGGGATAGCCGCTCCTGTGATTAGGTTATGTGGTAGACTAGAGCAAGATTCTCCTGCT
GGTTTTGAAGAAGTCAGCTGCCATGTTGTGAGACTGTCATGGGCTAGGGCATGAGCCTTTAAATATCT
GGGAGCAACCCCTGGCCAGCAGCCAGTGAGAAAACGGGGCCCTCAGTCCTACAATCACAAGGAATAA
ATTCTGCCAACAACTGAAGGAACCTTTGAAGAGGATCATGAGTCCCTTGATTCAGCTTGATGAGCCCC
TGAGCAGAGGATACAGCTAACTTGTACTAGGGAAGTATAAAAAACATGCATGGGAATGATATATATC
AACTTTAAGGATAATTGTCATACTTCTGGGAATGAAGGGAAAGAAATGGGGCTTTAGTTGTATTATGA
TCTTTAATTTCTCAAAAAAATAAGATCAGAAGCAAATATGGCAAAATGTTAATACTTTTGTGGGTAC
GTAGGTATTGAGCATACCTTTTTTTCTGAGTTCAAAATATTTTATAATTAAATGAAATGCAGGCCAGG
CACAGTGGCTCATGCCTATAATACCAGCACTTTGCGAGGCCGAGGTGGGAGGATGGCTTGAGGCCAGA
CCAGCCTGGCCAACATGGCAAAACCCCATCTCTACTTAAAAAAAAAAAACTATATATATATATATGT
GTGTGTGTGTGTATATATATATATGTATATATATTTATATATGTGTGTATATATATATATGTATATAT
TTATATATGTGTGTGTATATATATATATACACACACACACATATATACATACATACACACACACA
CACACACAATTAGCCAGGCATGGTGGCGCACACCTGTAGTCCCAGCTACTTGGGAGGCTGAGACATGA
GAATTGCTTGAACCTGGGAGGCAGAGTAGTTAGTGAGCTGAGATCATACCACTGCACTCCAGCCTGGT
GACAGAGTGAGACTCTGTCTTAAAAAAAATAAAAATTTAAATTTAAATGCAAAAGGTCCAAGTGAATT
GAAGAGGAAAGGGGTATCAAGGAAGGTTTTGTGGAGGTGACGTTTGAGCTGGGTCTTAAATGACTTA
AACATGGGATAAGAAGGGAGGGAATAAGGACATTTGAGGTACGAGAAATAAGGAGCATCAGTGGA
ACAACCTAACGTCTGTCAACCAGTGAATGGATAACAAAATGTAATTCAGATGGTATCCAACCTACGA
TGGTTCCAACATGAGATTTTTCTGACTTTAGGATAGATTTATCAAAGTAGTAAATCCATTTTCAACTTA
TGATATTTTCAACTTCAGATGGGTTTATCAGGACACAGTTGAGGAACACCTGTCTATCCATACAATTTG
GCAATAAAAAGGAAATGAGTGCAGATATACTCCACAACATGAATGAACCTTGAAAACATTAAGTGAG
AGAAGCCAGATACAAAAGGCCACATATTGTATGATTCTATTTATACAAAATGTCCAGAATAGGCAAAT
CTTATAGACAGCAAGTAGGTAGATGATCAGTTTGCTAGGTGCTGGGGGAAGGGGAAATGGGGAGTGA
TGGCTAAGGGGATTGGGTTTTCTTTGTGGGGAAATGAAAATGTTTTAAATTTGAGCGTGATAATGATTG
CTCAATGCTGCATATATATATAATCTATAGATTATATATATATAAAGAGAGGCTGTTAGACAGTGATA
AGTGATATATATATATATATACATAGAGAGAGAGAGAGAGAGAGAGAGAGAGGCTGTAGTGATAAGTG
ATCAGGAAAATAAAAAGTATTGAGGAGGAATACGAAGTTGACGGTGTGAAAACATGAGATTTTATATA

GGATGGCCAGGGAAGGCCTTAATGAGAAAGTGACTTATGAGTAAAAACAAGGGATCCTAAACCTTAG
CATGCATCAGAATCACTCGGAAACTTGTTAAAGCATAGCTTGCTGGGCCTCATCACAGATATTTTGATT
CGGTAGGTTCTTGCTGATATTAATACTTTTGGTCTAGGGAACCACATTTTGAGAACCACTGAGCTAAA
GGAAGTAAAGGTTTCCCTTAGTTTACTAGCTGGTAACCCTAGGAAACTGCTTAGCCTCTCGGTGCTAAG
ATACAAAATACTTTAGCACATAATAACACATGGAAAATAGTCTATAAATTATAAATATTATTTTTTATG
TACCAAATATTACATAAGACAAAATCTAAGCAAGATATATATATATATACATAAAATATAAGATATAT
ATGTATATATTATATATAGATAAATAGAGAGAGAGAGTTATGTTTAGAAAGAAAATACTTCAAACCTAA
AAAAAGAGAGGTAGGAAGTATACCATTCCATTATTGGTAAAAACAAATTACTAAGTAGTCTTTACAAA
AAACCAATCTCACTCCTTTAGAACACAAGCCCACCATTAAAACTGATGCAGAGGAATTTCTCTCCCTG
GCTTACCTTTAGGATGGTGCATACTAAGTTAGAAAAGTCATAAATGTTATATTAAAAGTAAATGTGAA
CTTACTTCCACAATCAAGACATTCTAGAAGAAAAAGAGAAATGAAAATCAGTACAATGAATAAAACG
GTATTTCCAATTATAAGTCAAATCACATCATAACAACCCTAAGGAATTATCCAAACTCTTGTTTTTAGA
TGCTTTATTATATCAAACCTCTCCTTTAAACAAGTGGCCCATCTGCTGGGATTTGGAAGCCTGTAATACT
GAAATTTTCATCATAATGGAAATTTTAAAAACAGAATTTGACCCACCTGTTTTTAAAAACACTTTCATTA
CTTAACAAGAGGTCTAATCTTGGGCAAGTCTTGAAATTTCTCTGGCCTTAGTTTCCCATGTGTAAATG
AACTTGAAGCAGTTGGTCTCTTATAGTCTCCTGACTCTAACATTCTAAGAATTATATTTGTACAATAA
CTCAAAAATCACATAATTTAATTTACCATATGGACTCCAAAATATATTTTCTCATTAGGCTAAACTTGA
TCTGCATTTTCTGGATGTGTCCATATTCTTGGACTACACTAAAACATGATACCAATGCTTCCTCTCACC
ATAAACCTCACTTCGCTTTCTACATTTAAGAATTTTATAGCTGGAAGAGTCCTTAACAGAAAATACCA
TCTAATAATTACCCCTCAAAATCGAGAAAGTCCTATCTGTTCTTATGCTAGTTATAAGAATGAGGCAGC
ATTTACATAATGGTTATAAACACTGCCACAAGAAGATTCATGATGTGTTGTTTATCTGTAGCTCTCAT
CATACTCTGTCAATAAATAAGATTATTAATGTTCTATATATTCTTCTAAGACAGTGTTTACC
AGAGTAAGGCACAAAAGATCCACTGGTTTGCAAGAAAGATTAGAAGTTTAAATTTTTTAACTCACC
TTGTTAATCTATATTTTTGTATGTATTTTGTAAACATATATATTATTATTACCATAAATCATATATAATTT
AAAATGCATATATTAGGGGTAAATGCTCAGGAAACTTTTTATAAATTGGGCATGCAAATACAAGTTTG
AAGACTCACTGTTCTAGGTATTAAGTAAGTTATAACCAAGTAAAGCTTCCACCTTTTCATGTCTCA
AAGCAGTTTATTGTTGGAGGTAAGATCTCTAGAAGCCTAAACAGGTCCAAGTACAGAATGAAGTAAG
GCTAGCCCATAACTTGTGGCAAGCAATTCATACTATTTCTCTCATGCTGAGCTCTCCTCAGTGAAGCAG
CTACTATAGACAACCTGCAGCCTATTGGTAGCCTATTTTACAGGCAGGAAAAAAATTACTTTTTTATTCA
AAGTGGAACCTCAGGACATGGGGAGAAAATGAATACAAAAAATAGGGTCAATCCAAAGGCACACAGC
AAATGAGTAACACAGTTATGTTTTTTTTCCCATTTGTATGAGGTCCAGTAAATTCTAAGTAAACTGCAA
ATTTAATAATACACTAAAAAAGCCATGCAATTGTTCAAATGAATCCCAGCATGGTACAAGGAGTACAG
ACACTAGAGTCTAAAAAACAAAAGAATGCCATTATTGAGTTTTTTGAATTATATCAAGTAGTTACATCT
CTACTTAATAAATGAGAAAAACGAGGATAAGAGGCCATTTGATAAAATGAAAATAGCCAAGAAGTGG
TATTAGAGACTTGAATACAGGTATTCGGGTCCAAAGTTCATCTGCTCAAATACTAACTGGGGAAAAGA
GGGAAAAATATTTATATACATATATATCTGCACACAAAAATACCCCCAAAAGACAAAATGAGGCCAG
GCAGGGTGGCTCACACCCGTAATCCCGGTACTTTGGGAGGCTGAGGCAGGTGGATACCTGAGATCAGG

FIG. 2A

AGTTGGAGATCAGCCTGGTCAACATGGTGAAACCCTGTCTCTACTAAAGATAAAAAAATTAGCCAGGC
ATGGTGGCGTGCGCCTGTAATCCCAGCTACTTGGGAGTCTGAGGCAGGAGAATCACTTGAAGTGGGAA
GGGGAGGTTGCAGTGAGCCAAGATCGTACTACTGCACTCCAGCCTGGGCAGCAGAGTGAGACTCCATC
ACAAAAATAAATAAATAAATAAATAACAATGAAACAGAAAGTTCAAATAATCCCATAATCTTACCAC
CAAGAAATAACTTTCACTCGTTATACTTATTGATTTTTCCATAATAAATGTACTTTACTGTGACTATCAT
GAAAAGAAAGTTATTTTAGAAACAGAGAACTGTTTCAGATCAAATCTATGTAGTAGAACAGAGCCATT
AGGTGGGAAAGACGAGATCAAATAAATCTCAGAAGGCCTAAAAGGCTAGGTCCATTCCAGCACTAA
AAACTGACCAGACAAGTAATGGCTTCAACAGCTTCTAAATATGGACAAAGCATGCTGAAAGGGAAGG
ACAGGTCTAACAGTGGTATATGAAATGAACAGGAGGGGCAAAGCTCATTCTCTCTGAAGTTTTCCA
AAGATGCTGAGGAGGACATTAGTTTGACATGACCCTGATATGGGACAAGATAATTCACAGAAGTTTT
ACATGTAAAGTTTTCTTATAGATACTCATTCAAGTAAGCAATGAACACTAAAATCTAAAGAAAGAAA
AGAGCTTTAGAGTCAGGTCTGTATTCAAATTCAGCTCTACCACTTACTGGTTCTGTGACTTTGGGCAA
GTCTTTTAACCTTATTAAGTCTTAATTTCTGATTTGTAAGTGGGATATCGTCTCCCTCACAGGATTG
TTGTGAAACTTTTATGAGATTAATGCCTTTATATTTGGCATAGTGTAAGTAAACAATAACTGGCAGCTT
CAAAAAAAAAAAGCAGTAGCATTCCATCATTATTATTGGTTACTCTCAAAAAGTTTTTCAATGTACTA
GAAGATAAATATTCAAATACCTTAATATCTCCATTATTTTCAGGTAAACAGCATGCTCCTGAACAACCA
ATGGGTCAACAAATAAATTAAGGGAAATCTAAAAACATCTTGATATTAACTACATGGAAGCACA
ATATACCAAACCAATGGTTCACACTAGGAGAATTTTAAGGTACAAGAAAACCTCTTTGAGATTTCTTA
AAATAATAGTATGTCTGAATTTATTGAGTGATTTACCAGAACTGTTGTAAGAGCTCTACTTGCATTAT
AGCACTTAATCCTCTTAACCTCTATGGCTGCTATTATCAACCTCACCTAATCACATATGGGACACAGAG
AGGTAAAGTAACTTGCCCAAGGTCAGAGTTAGGAAGTACTAAGCCATGCTTTGAATCAGTTGTCAGGC
TCCGGAACCTCACACTTTTCAGCCACTACATAATACTGCTTTGCTATCTTTTAGGAACTATGTGAGTCTA
CCTCACATAGACTCACATAGGTTTGTTTTTTTTTTTTTTTTAAAGGCTATCTTTTCCCCCATCAATGTTTT
TTGAAGGATCCCAAATTAGAGTCCACAGAGGCAGACAGCAGTACTTGACAATATGGACATTTAAGGT
TAATGTTGGATTCTACTGTCTTTTTACTACATGACCTAGGGAACGATAATTAACCTAGACTGCTTCCAA
GGGTAAATAACCCATTAGTTATACTATGTAAATTATCTCTTAGTGATTGATTGAAAGCACACTGTTA
CTAATTGACTCGGTATGAAGTGCTTTTTTTTCTTCCCTTTCAAGATACATACCTTTCCAGTTAAAGTTGA
GAGATCATCTCCACCAATTACTTTTATGTCCCTGTTGACTGGTCATTCTAGTTAAAAAAAAAAAAAACT
ATATATATATATATCTACACACACATATGTATATGTATATCCTTATGTACACACACAACTTCAAATTA
AATGAGAACTAGAAGATTTGAGAAGTTAGCTAGCTAATATCCATAGCATTATGATATTCTAAATGATA
TGAATTATAAGAATTAGGTTTCCTGAAATGAATGACTAGAAAACCTTCAAGTAGAGATTAGTAAAAAT
TAAAAAGTCCTAATCGGCCATTACTGATTTGATGTTTTTAAGAGTCCTAAAAAATGGGTACATCCATT
TTTAAGTGGGTAGTATTATAACAGCCACCCATCTTCAATCACAGTGATTTCTGAATTGTGAGGGAAGTT
ATTAGCATGACAGGTGTCTGGTTCTGGCCCTGTACGATCCCATGAGTCAAGCAAATTGTAAGGGCTG
GTCTATATCACACCCAACCCCAAGGATATGTCCCTCAAAGTCTAGCCCAGGCCCGTCATCTTCAGC
ATCATCTGGGAAACCAGGTCTGATTAGTAGTCCTTTAAGGAATACCTCTTAGGCTCCCATTTTACTGCT
ATCACAGAATCCAATAAAACCCTTACAGGAGATTCAATGGGAAATGCTCAACACCCACTGTAGTTGGT

FIG. 2B

GGTGACAATGACCATAATTTGGCTGTGCTGGATTTCAGGACAGAAAATTTGGGTGAAAGAGCAGGTGA
ACAAAAGAGCTTCGACTTGCCCTAGCAGAGAGCAAGCCATACCATACCACAAAGCCACAGCAATTAC
AACGGTGCAGTACCAGCACAGTAAATGAACAAAGTAGAGCCCAGAAACAGACCCAGAACTATATGAG
GATTTAGTATACAATAAAGATGGTATTTTCGAGTCAGTAGGGAAAAGATGAATTATTCAATAAATGATG
TTTGGCCAAC TAGTAACCCATTTGGGAAAAAATAAAAGTATGGTCCCTACCTCACAGCATAACAAAA
ATAAATTCCAGACGGATTAAATCTAAATGTAAAAAATAAAGCCATAAGTGGACTGGAAGAAAATAG
AGAATTTTTTTTAACATCCGTAGAAAGGGTAAAAACCCAGGCATGACATGAACCAAACTGAAGAGG
TTCTGTAACAAATACCCCTTTTATATATTGGGCTCCAACAATAAGAACCCATAGGAAAATGGAGAAT
GAACACAAATAGACAATTTATAGAAGAGAAGGTTATAAGGTGTAAATTTATATCTATCTGAGAAACA
AACACTAAAACAATGTGATTCTACTGTTCTCCACCCATACTGGCAAACTTAAGCCTGATAATATGCT
GAGGGGAAATAAGCACTCTTGTTGGTGAGAGTATTAATTGGCATAGCTTCTTTTGAAAATGACATAGC
AATACCTGTTAAAATTGCAAACATGCATGTCACTTAATTCCATGTAATTCCTACTTCTGGGAATCAATT
GCTACAAAAACACTTGACAAGTATACAAAGATACATTCAAGAGTGTTCACTGGGCCGGGTGCGGTGGC
TTCATGCCTGTAATCCCAGGGAGGCAGAGGCAAGACGATCGCTTGACCCAGGAGTTCAAGGCCAGCC
CGAGAAACACAGCAAGACCCTGTCTCTCTTTTTTTTTATTTAAAAAATAAATGTTCACTGTATCAGTTGT
TCACAAAAACAAACCAACATGTCCATTAACAGGGAACCATTTAAATTAATCAAGTTCATCTACACAAT
GTAATACCATGCAACTATTA AAAAGCACCTGATAATCCAAAGCACACTGAGACAGAATAATGCTATTA
AAAACACCAAGTAGTGGAACACTGTGTTGCCTATGACACCATTTTTATTCAACATTTAAACAAATTTGT
AACAGCAATTACATGAGTAGTGACAATGGCGTTTATGAGACTTTTCACTTTTATGTGCTTCTATTTTTGT
TATGCTTCTATATATACATCCATTTATTATGGAGTGTTACTTTCAAAAATCACAAATGGGCCAGTATTA
TTTGGTGTTGCAAGGTGAGCATATGACTTCTGATATCAACCTTTGCATATTACTTCTCAATTTAGGGAA
ATTACAGACATCCCTTATTCTAACTAACTTAAAACCCAGCATTTCAAACATACAGAATTGATGGGGAA
AAAAAAGAAAGAAGAAAGAAAGAAAAGGCAACAAGCTTCAGATGACAGTGACTCACATCAAATTATT
TATAAAATCTGTTAAATAGTGCCATCTTCTGGAGATACCTGGTATTACAGTCCAACTCCAGTTGATGTC
TTTACAGAGACAAGAGGAATAAAGGAAAAAATATTCAAGAAGTGAAGATGAGGAGTCATGGAAAAA
TTGCTGTGATCCAAAGGCTACGGTGATAGGACAAGAAACAAGAGAACTCCAAGCAGTAAGACACTGC
TGTTCTATTAGCATCCAAACCTCCATACCTCCTGTTTGCCCCAAGGCTTTTTTAAAAAATAGAGACAGG
ATCTCACTATTTTGCTCAGGCTGGTCTTGAACCTCCTGGACTCAAGCTATCCTCCTGCCTCGGCCTCCTAA
AGTGCCGAGATTACAGGCTTGAGTCACCATACCTGGCTATTTATTTTTCTTAACTCTCTTGCCTGGCCT
ATAGCCACCATGGAAGCTAATAAAGAATATTAATTTAAGAGTAATGGTATAGTTCACTACATTGGAAT
ACAGGTATAAGTGCCTACATTGTACATGAATGGCATAACATGGATCAATTACCCACCTGGGTGGCCAA
AGGAACTGCGCGAACCTCCCTCCTTGGCTGTCTGGAACAAGCTTCCCACTAGATCCCTTTACTGAGTGC
CTCCCTCATCTTTAATTATGGTTAAGTCTAGGATAACAGGACTGGCAAAGGTGAGGGGAAAGCTTCCT
CCAGAGTTGCTCTACCTCTCCTCTACCGTCCTATCTCCTCACTCCTCTCAGCCAAGGAGTCCAATCTGT
CCTGAACTCAGAGCGTCACTGTCAACTACATCAAAATTGCCAGAGAAGCTCTTTGGGACTACAAACAC
ATACCCTTAATGTCTTTATTTCTATTTTGTCTACCTCTTCAGTCTAGGTGAAAAAATAGGAAGGATAAT
AGGGAAGAAGCTTTGTTTATGCCTACTTATCCGCCCTAGGAATTTTGAAAACCTCTAGGTAGCAATAA

FIG. 2C

GAAGTGCAGCATGGTATAGAAAAAGAGGAGGAAAGCTGTATAGAAATGCATAATAAATGGGCAGGA
AAAGAACTGCTTGGAACAAACAGGGAGGTTGAACTATAAGGAGAGAAAGCAGAGAGGGCTAATCAAC
AAGGCTGGGTTCCCAAGAGGGGCATGATGAGACTATTACTAAGGTAGGAATTACTAAGGGCTCCATGTC
CCCTTAGTGGCTTAGTACTATGTAGCTTGCTTTCTGCAGTGAACCTCAGACCCTTCTTTTAGGATCCTAG
AATGGACTTTTTTTTTTATCGGAAAACAGTCATTCTCTCAACATTCAAGCAGGCCCCAAGTCTACCAC
ACTCAATCACATTTTCTCTTCATATCATAATCTCTCAACCATTCTCTGTCCTTTTAACTGTTTTTCTATAC
CCTGATCAAAATGCCAACAAAAAGTGAGAATGTTAGAATCATGTATTTTTAGAGGTAGACTGTATCTCA
GATAAAAAAAGGGGCAGATATTCCATTTTCCAAAATATGTATGCAGAAAAAATAAGTATGAAAGG
ACATATGCTCAGGTAACAAGTTAATTTGTTTACTTGTATTTTATGAATTCCCTAAAACCTACGTCACCC
GCCCCGTTCCACGCCCCGCGCCACGTCACAACTCCACCCCCTCATTATCATATTGGCTTCAATCCAA
AATAAGGTATATTATTGATGATGTTAATTAACATGCATGGATCCATATGCGGTGTGAAATACCGCACA
GATGCGTAAGGAGAAAAATACCGCATCAGGCGCTCTTCCGCTTCCTCGCTCACTGACTCGCTGCGCTCG
GTCGTTCCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGG
GGATAACGCAGGAAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCG
GTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGACGCTCAAGTCAGA
GGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGCGCTCT
CCTGTTCCGACCCTGCCGTTACCGGATACCTGTCCGCCTTTCTCCCTTCGGGAAGCGTGCGCTTTCTC
ATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTCCGCTCCAAGCTGGGCTGTGTGCACGAAC
CCCCGTTACGCCCCGACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACG
ACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACA
GAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGGACAGTATTTGGTATCTGCGCTCTGCT
GAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCG
GTGGTTTTTTTTGTTTGCAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATC
TTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAACCTCACGTTAAGGGATTTTGGTCATGAGATTATC
AAAAAGGATCTTCACCTAGATCCTTTTAAATTA AAAATGAAGTTTTAAATCAATCTAAAGTATATATG
AGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTC
GTTTCATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCC
CCAGTGCTGCAATGATACCGCGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATAAACCCAGCCA
GCCGGAAGGGCCGAGCGCAGAAGTGGTCCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTG
CCGGGAAGCTAGAGTAAGTAGTTCGCCAGTTAATAGTTTGCGCAACGTTGTTGCCATTGCTGCAGCCA
TGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTCACGTAGAAAGCCAGTCCGCAGAAACGGTGC
TGACCCCGGATGAATGTCAGCTACTGGGCTATCTGGACAAGGGAAAACGCAAGCGCAAAGAGAAAGC
AGGTAGCTTGCAGTGGGCTTACATGGCGATAGCTAGACTGGGCGGTTTTATGGACAGCAAGCGAACCG
GAATTGCCAGCTGGGGCGCCCTCTGGTAAGGTTGGGAAGCCCTGCAAAGTAACTGGATGGCTTTCTT
GCCGCCAAGGATCTGATGGCGCAGGGGATCAAGCTCTGATCAAGAGACAGGATGAGGATCGTTTCGC
ATGATTGAACAAGATGGATTGCACGCAGGTTCTCCGGCCGCTTGGGTGGAGAGGCTATTCGGCTATGA
CTGGGCACAACAGACAATCGGCTGCTCTGATGCCGCCGTGTTCCGGCTGTCAGCGCAGGGGCGCCCCG

FIG. 2D

TTCTTTTGTCAAGACCGACCTGTCCGGTGCCCTGAATGAACTGCAAGACGAGGCAGCGCGGCTATCG
TGGCTGGCCACGACGGGCGTTCCTTGCGCAGCTGTGCTCGACGTTGTCACTGAAGCGGGAAGGGACTG
GCTGCTATTGGGCGAAGTGCCGGGGCAGGATCTCCTGTCATCTCACCTTGCTCCTGCCGAGAAAGTAT
CCATCATGGCTGATGCAATGCGGCGGCTGCATACGCTTGATCCGGCTACCTGCCCATTGACCACCAA
GCGAAACATCGCATCGAGCGAGCACGTACTCGGATGGAAGCCGGTCTTGTCGATCAGGATGATCTGGA
CGAAGAGCATCAGGGGCTCGCGCCAGCCGAACTGTTGCGCCAGGCTCAAGGCGAGCATGCCCCGACGGC
GAGGATCTCGTCGTGACCCATGGCGATGCCTGCTTGCCGAATATCATGGTGGA AAAATGGCCGCTTTTCT
GGATTCATCGACTGTGGCCGGCTGGGTGTGGCGGACCGCTATCAGGACATAGCGTTGGCTACCCGTGA
TATTGCTGAAGAGCTTGGCGGCGAATGGGCTGACCGCTTCCTCGTGCTTTACGGTATCGCCGCTCCCGA
TTCGCAGCGCATCGCCTTCTATCGCCTTCTTGACGAGTTCCTTCTGAATTTTGT TAAAATTTTGT TAAAT
CAGCTCATTTTTTAACCAATAGGCCGAAATCGGCAAAATCCCTTATAAATCAAAAGAATAGACCGAGA
TAGGGTTGAGTGTTGTTCCAGTTTGGAACAAGAGTCCACTATTAAAGAACGTGGACTCCAACGTCAA
GGCGAAAAAACCGTCTATCAGGGCGATGGCCCACTACGTGAACCATCACCTAATCAAGTTTTTTGGG
GTCGAGGTGCCGTAAAGCACTAAATCGGAACCCTAAAGGGAGCCCCCGATTTAGAGCTTGACGGGGA
AAGCCGGCGAACGTGGCGAGAAAGGAAGGGAAGAAAGCGAAAGGAGCGGGCGCTAGGGCGCTGGCA
AGTGTAGCGGTACGCTGCGCGTAACCACCACACCCGCCGCGCTTAATGCGCCGCTACAGGGCGCGTC
CATTCGCCATTCAGGATCGAATTAATTCTTAATTAA

FIG. 2E

SEQ ID NO:2 Human TM amino acid sequence

MLGVLVLGALALAGLGFPAPAEPPQPGGSQCVEHDCFALYPGPAT
FLNASQICDGLRGHLMTVRSSVAADVISLLLNGDGGVGRRRLWIGLQLPPGCGDPKR
LGPLRGFQWVTGDNNTSYSRWARLDLNGAPLCGPLCVAVSAAEATVPSEPIWEEQQ
CEVKADGFLCEFHFPAATCRPLAVEPGAAAAAVSITYGTPFAARGADFQALPVGSSAA
VAPLGLQLMCTAPPGAVQGHWAREAPGAWDCSVENGCGCEHACNAIPGAPRCQCPA
GAALQADGRSCTASATQSCNDLCEHFCVPNPDQPGSYSCMCETGYRLAADQHRCED
VDDCILEPSPCPQRCVNTQGGFECHCYPNYDLVDGECVEPVDPCFRANCEYQCQPLN
QTSYLCVCAEGFAPIPEPHRCQMFCNQTACPADCDPNTQASCECPEGYILDDGFICT
DIDECENGGFCSGVCHNLPGTFCICGPDSALARHIGTDCDSGKVDGGDSGSGEPPPS
PTPGSTLTPPAVGLVHSGLLIGISIASLCLVALLALLCHLRKKQGAARAKMEYKCAA
PSKEVVLQHV RTERTPQRL

FIG. 3

SEQ ID NO:3 human TM nucleotide sequence

atgcttggg gtcttggcc ttggcgcgt ggccctggcc ggcctggggt tccccgcacc cgcagagccg cagccgggtg
gcagccagtg cgtcgagcac gactgcttcg cgctctaccc gggccccgcg accttctca atgccagtca gatctgcgac
ggactgcggg gccacctaata gacagtgcgc tctcgggtgg ctgccgatgt catttcttg ctactgaacg gcgacggcgg
cgttggccgc cggcgcctct ggatcggcct gcagctgcc cccggctgcg gcgaccccaa gcgcctcggg cccctgcgcg
gcttccagtg ggttacggga gacaacaaca ccagctatag cagggtgggca cggctcgacc tcaatggggc tcccctctgc
ggcccggtgt gcgtcgctgt ctccgtgtg gaggccactg tgcccagcga gccgatctgg gaggagcagc agtgccaagt
gaaggccgat ggcttctct gcgagttcca ctcccagcc acctgcaggc cactggctgt ggagcccgcc gccgcggctg
ccgccgtct gatcacctac ggcacccgt tcgcggcccg cggagcggac ttccaggcgc tgccgggtggg cagctccgcc
gcggtggctc cctcggctt acagctaata tgcaccgcgc cggccggagc ggtccagggg cactgggcca gggaggcgc
gggcgcttg gactgcagc tggagaacgg cggctgcgag cagcgtgca atgcgatcc tggggctccc cgctgccagt
ggccagccgg cgcggccctg caggcagacg ggcgtcctg caccgcatcc gcgacgcagt cctgcaacga cctctgcgag
cacttctgcg ttccaaccc cgaccagccg ggctctact cgtgcatgtg cgagaccggc taccggctgg cggccgacca
acaccggtgc gaggacgtgg atgactgcat actggagccc agtccgtgtc cgcagcgtg tgtcaacaca cagggtgggt
tcgagtcca ctgctaccct aactacgacc tggtgagcgg cgagtgtgtg gagcccgtgg acccgtgctt cagagccaac
tgcgagtacc agtgccagcc cctgaacaa actagctacc tctgcgtctg cgccgagggc ttgcgcccc ttcccacga
gccgcacagg tgccagatgt ttgcaacca gactgcctgt ccagccgact gcgacccaa caccaggct agctgtgagt
gcccgaagg ctacatctg gacgacggt tcatctgcac ggacatcgac gagtgcgaaa acggcggctt ctgctccggg
gtgtgccaca acctccccgg taccttcgag tgcattcgcg ggcccgaact ggcccttgcc cgccacattg gcaccgactg
tgactccggc aaggtggacg gtggcgacag cggctctggc gagccccgc ccagcccgc gcccggctcc acctgactc
ctccggccgt ggggctcgtg cattcgggct tgctcatagg catctccatc gcgagcctgt gcctgggtgt ggcgctttg
gcgtcctct gccacctgc caagaagcag ggcgccgcca gggccaagat ggagtacaag tgcgcggccc ctccaagga
ggtagtgtg cagcacgtgc ggaccgagc gacgccgcag agactc

FIG. 4

SEQ ID NO: 4

GTTTAAACGGGGCCCTCTAGACGCGTTGACATTGATTATTGACTAGTTATTAATAGTAATCAATTACGGG
GTCATTAGTTCATAGCCCATGATATCATATGGAGTTCCGCGTTACATAAATTACGGTAAATGGCCCGCC
TGGCTGACCGCCCAACGACCCCCGCCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGCCAA
TAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGTAAACTGCCCACTTGGCAGTACATCAA
GTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATG
CCCAGTNCATGACCTTATGGGACTTTTCTACTTGGCAGACATCTACGTATTAGTCATCGCTATTACCAT
GGTGATGCGGTTTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTTCCAAGT
CTCCACCCCAATTGACGTCAATGGGAGTTTGTGTTTGGCACCAAAATCAACGGGACTTTCCAAAATGTCGT
AACAACTCCGCCCCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGTCTATATAAGCAGAG
CTCTCTGGCTAACTAGAGAACCCCTGCTTACTGGCTTATCGAGATATCTGCAGAATTCATCTGTGCGACT
GCTACCGGCAGCGCGCAGCGGCAAGAAGTGTCTGGGCTGGGACGGACAGGAGGTGTGCGCCATCG
GCGTCCTGTGCCCTCTGCTCCGGCACGGCCCTGTCGCAGTGCCCGCGCTTTCCCGGCGCCTGCACGC
GGCGCGCCTGGGTAACATGCTTGGGGTCTGCTGCTTGGCGCGCTGGCCCTGGCCGGCCTGGGGTTCC
CCGACCCCGCAGAGCCGCGAGCCGGGTGGCAGCCAGTGCCTCGAGCACGACTGCTTCGCGCTCTACCCG
GGCCCCGCGACCTTCTCAATGCCAGTCAGATCTGCGACGGACTGCGGGGCCACCTAATGACAGTGC
CTCCTCGGTGGCTGCCGATGTCAATTTCTTGTACTGAACGGCGACGGCGGCGTTGGCCGCCGGCGCCT
CTGGATCGGCCTGCAGCTGCCACCCGGCTGCGGCGACCCCAAGCGCCTCGGGGCCCTGCGCGGCTTCC
AGTGGGTACGGGAGACAACAACACCAGCTATAGCAGGTGGGCACGGCTCGACCTCAATGGGGCTCC
CCTCTGCGGCCCCGTTGTGCGTGCCTGTCTCCGCTGCTGAGGCCACTGTGCCAGCGAGCCGATCTGGGA
GGAGCAGCAGTGCGAAGTGAAGGCCGATGGCTTCTCTGCGAGTTCCACTTCCCAGCCACCTGCAGGC
CACTGGCTGTGGAGCCCCGCGCCGCGCTGCCGCGCTCTCGATCACCTACGGCACCCCGTTGCGGGCC
CGCGGAGCGGACTTCCAGGCGCTGCCGTTGGGCGAGCTCCGCGCGGTGGCTCCCCCTCGGCTTACAGCT
AATGTGCACCGCGCCCGCCGGAGCGGTCCAGGGGCACTGGGCCAGGGAGGCGCCGGGCGCTTGGGAC
TGCAGCGTGGAGAACGGCGGCTGCGAGCACGCGTGCAATGCGATCCCTGGGGCTCCCCGCTGCCAGTG
CCCAGCCGGCGCCGCCCTGCAGGCAGACGGGCGCTCCTGCACCGCATCCGCGACGCAGTCCTGCAACG
ACCTCTGCGAGCACTTCTGCGTTCCCAACCCCGACCAGCCGGGCTCCTACTCGTGATGTGCGAGACC
GGCTACCGGCTGGCGGCCGACCAACACCGGTGCGAGGACGTGGATGACTGCATACTGGAGCCCAGTC
CGTGTCGCGAGCGCTGTGTCAACACACAGGGTGGCTTCGAGTGCCACTGCTACCCTAACTACGACCTG
GTGGACGGCGAGTGTGTGGAGCCCGTGGACCCGTGCTTCAGAGCCAATGCGAGTACCAGTGCCAGCC
CCTGAACCAAATACTAGCTACCTCTGCGTCTGCGCCGAGGGCTTCGCGCCCCATTCCCCACGAGCCGCACA
GGTGCCAGATGTTTTGCAACCAGACTGCGTGTCCAGCCGACTGCGACCCCAACACCCAGGCTAGCTGT
GAGTGCCCTGACATCCTGGAGCAGCGTTTTCATCTGCACGAGCATCGAGGTGCGAAAACGG
CGGCTTCTGCTCCGGGGTGTGCCACAACCTCCCCGGTACCTTCGAGTGCACTGCGGGCCCGCAGCTCGGC
CCTTGCCCGCCACATTGGCACCGACTGTGACTCCGGCAAGGTGGACGGTGGCGACAGCGGCTCTGGCG
AGCCCCCGCCAGCCCGACGCCCGGCTCCACCTTGACTCCTCCGGCCGTGGGGCTCGTGCAATTCGGGC
TTGCTCATAGGCATCTCCATCGCGAGCCTGTGCCTGGTGGTGGCGCTTTTGGCGCTCCTCTGCCACCTG
CGCAAGAAGCAGGGGCGCCGCCAGGGCCAAGATGGAGTACAAGTGCGCGGCCCTTCCAAGGAGGTAG
TGCTGCAGCACGTGCGGACCGAGCGGACGCCGACAGAGACTCTGAGCGGCCTCCGTCCAGGAGCCTGG
CTCCGTCCAGGAGCCTGTGCCTCCTACCCCCAGCTTTGCTACCAAAGCACCTTAGCTGGCATTACAGC
TGGAGAAGACCCTCCCCGCACCCCCCAAGCTGTTTTCTTCTATTCCATGGCTAACTGGCGAGGGGGTG
ATTAGAGGGAGGAGAATGAGCCTCGGCCTCTTCCGTGACGTCACTGGACCACTGGGCAATGATGGCAA
TTTTGTAACGAAGACACAGACTGCGATTTGTCCAGGTCCTCACTACCGGGCGCAGGAGGGTGAGCGT
TATTGGTCGGCAGCCTTCTGGGCAGACCTTGACCTCGTGGGCTAGGGATGACTAAAATATTTATTTTTT
TTAAGTATTTAGGTTTTTTGTTTGTCTTCTTACCTGTATGTCTCCAGTATCCACTTTGCACAGCT
CTCCGGTCTCTCTCTCTCTACAACTCCCACTTGTCAATGTGACAGGTAAACTATCTTGGTGAATTTTTTT
TTCTAGCCCTCTCACATTTATGAAGCAAGCCCCACTTATTTCCCATTTCTTCTAGTTTTCTCCTCCCAG
GAACTGGGCCAACTCACCTGAGTCACCCTACCTGTGCCTGACCCTACTTCTTTTGTCTTAGCTGTCTG
CTCAGACAGAACCCTACATGAAACAGAAACAAAAACACTAAAAATAAAAAATGGCCATTTGCTTTTTT
ACCAGATTTGCTAATTTATCCTGAAATTTGAGATTCCCAGAGCAAAATAATTTTAAACAAAGGTTGAG
ATGTAAGAGGTATTAATTTGATGTTGCTGGACTGTCATAGAAATTACACCCAAAGAGGTATTTATCTTT
ACTTTTAAACAGTGAGCCTGAATTTTGTGCTGTTTTGATTTGTACTGAAAAATGGTAATTGTTGCTAA

FIG. 5

TCTTCTTATGCAATTTCTTTTTTGTATTATTACTTATTTTTGACAGTGTTGAAAATGTTTCAGAAGGTT
GCTCTAGATTGAGAGAAGAGACAAACACCTCCCAGGAGACAGTTCAAGAAAGCTTCAAACCTGCATGA
TTCATGCCAATTAGCAATTGACTGTCACTGTTCCCTTGTCAGTGGTAGACCAAAAATAAAACCAGCTCTAC
TGGTCTTGTGGAATTGGGAGCTTGGGAATGGATCCTGGAGGATGCCCAATTAGGGCCTAGCCTTAATC
AGGTCCTCAGAGAATTTCTACCATTTTCAGAGAGGCCTTTTGGAATGTGGCCCCTGAACAAGAATTGGA
AGCTGCCCTGCCCATGGGAGCTGGTTAGAAATGCAGAATCCTAGGCTCCACCCCATCCAGTTCATGAG
AATCTATATTTAACAAGATCTGCAGGGGGTGTGTCTGCTCAGTAATTTGAGGACAACCATTCCAGACT
GCTTCCAATTTTCTGGAATACATGAAATATAGATCAGTTATAAGTAGCAGGCCAAGTCAGGCCCTTATT
TTCAAGAACTGAGGAATTTTCTTTGTGTAGCTTTGCTCTTTGGTAGAAAAGGCTAGGTACACAGCTCT
AGACACTGCCACACAGGGTCTGCAAGGTCTTTGGTTTCAGCTAAGCTAGGAATGAAATCCTGCTTCAGT
GTATGGAAATAAATGTATCATAGAAATGTAACCTTTGTAAGACAAAGGTTTTCTCTTCTATTTTGTAA
ACTCAAAATATTTGTACATAGTTATTTATTTATTGGAGATAATCTAGAACACAGGCAAAATCCTTGCTT
ATGACATCACTTGTACAAAATAAACAAATAACAATGTGAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAGGTAGCAGTCGACAGATGAATTCACCACACTGGACTAGTGGATCCGAGCTCGGT
ACCAAGCTTAAGTTTAAAC

FIG. 5A

SEQ ID NO 5

TCTAGACGCGTTGACATTGATTATTGACTAGTTATTAATAGTAATCAATTACGGGGTCATTAGTTCATA
GCCCATGATATCATATGGAGTTCCGCGTTACATAACTTACGGTAAATGGCCCGCCTGGCTGACCGCCC
AACGACCCCCGCCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCA
TTGACGTCAATGGGTGGAGTATTTACGGTAAACTGCCCACTTGGCAGTACATCAAGTGTATCATATGC
CAAGTACGCCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCCCAGTNCATGAC
CTTATGGGACTTTCCTACTTGGCAGACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTT
TGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTTCCAAGTCTCCACCCCATTG
ACGTCAATGGGAGTTTGTTTTGGCACCAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCC
CCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGTCTATATAAGCAGAGCTCTCTGGCTAAC
TAGAGAACCCCTGCTTACTGGCTTATCGAGATATC

FIG. 6

SEQ ID NO 6

GGCAGCGCGCAGCGGCAAGAAAGTGTCTGGGCTGGGACGGACAGGAGAGGCTGTGCGCCATCGGGCGTCC
TGTGCCCCCTCTGCTCCGGCACGGCCCTGTGCGAGTGCCCCGCGCTTTCCCCGGCGCCTGCACGCGGGCGCG
CCTGGGTAACATGCTTGGGGTCCTGGTCCTTGGCGCGCTGGCCCTGGCCGGCCTGGGGTTCCCCGCACC
CGCAGAGCCCGCAGCCGGGTGGCAGCCAGTGCGTTCGAGCAGACTGCTTCGCGCTCTACCCGGGGCCCCG
CGACCTTCCTCAATGCCAGTCAGATCTGCGACGGACTGCGGGGCCACCTAATGACAGTGCGCTCCTCG
GTGGCTGCCGATGTCAATTTCTTGCTACTGAACGGCGACGGCGGCGTTGGCCGCCGGCGCGCTCTGGAT
CGGCCTGCAGCTGCCACCCGGCTGCGGCGACCCCAAGCGCCTCGGGCCCCTGCGCGGCTTCCAGTGGG
TTACGGGAGACAACAACACCAGCTATAGCAGGTGGGCACGGCTCGACCTCAATGGGGCTCCCCTCTGC
GGCCCGTTGTGCGTCGCTGTCTCCGCTGCTGAGGCCACTGTGCCCAGCGAGCCGATCTGGGAGGAGCA
GCAGTGCGAAGTGAAGGCCGATGGCTTCCTCTGCGAGTTCCACTTCCCAGCCACCTGCAGGCCACTGG
CTGTGGAGCCCCGGCGCCGCGGCTGCCGCCGTCTCGATCACCTACGGCACCCCGTTTCGCGGCCCGCGGA
GCGGACTTCCAGGCGCTGCCGGTGGGCAGCTCCGCCGCGGTGGCTCCCCCTCGGCTTACAGCTAATGTG
CACCAGCCCGCCCGGAGCGGTCCAGGGGCACTGGGCCAGGGAGGCGCCGGGCGCTTGGGACTGCAGC
GTGGAGAACGGCGGCTGCGAGCACGCGTGCAATGCGATCCCTGGGGCTCCCCGCTGCCAGTGCCCGC
CGCGCCCGCCCTGCGAGGCAGACGGGCGCTCCTGCACCGCATCCGCGACGCACTCTGCAACGACCTCT
GCGAGCACTTCTGCGTTCCCAACCCCGACCAAGCCGGGCTCCTACTCGTGATGTGCGAGACCGGCTAC
CGGCTGGCGGCCGACCAACACCGGTGCGAGGACGTGGATGACTGCATACTGGAGCCCAGTCCGTGTCC
GCAGCGCTGTGTCAACACACAGGGTGGCTTCGAGTGCCACTGCTACCCTAACTACGACCTGGTGGACG
GCGAGTGTGTGGAGCCCGTGGACCCGTGCTTCAGAGCCAACTGCGAGTACCAGTGCCAGCCCTGAAC
CAAAGTAGCTACCTCTGCGTCTGCGCCGAGGGCTTCGCGCCCAATTCCCCACGAGCCGCACAGGTGCCA
GATGTTTTGCAACCAGACTGCCTGTCCAGCCGACTGCGACCCCAACACCCAGGCTAGCTGTGAGTGCC
CTGAAGGCTACATCCTGGACGACGGTTTCATCTGCACGGACATCGACGAGTGCGAAAACGGCGGCTTC
TGCTCCGGGGTGTGCCACAACCTCCCCGGTACCTTCGAGTGATCTGCGGGCCCGACTCGGCCCTTGCC
CGCCACATTGGCACCGGACTGTGACTCCGGCAAGGTGGACGGTGGCGACAGCGGCTCTGGCGAGCCCCC
GCCAGCCCGCCCGGCTCCACCTTGACTCCTCCGGCCGTGGGGCTCGTGCAATTCGGGCTTGCTCAT
AGGCATCTCCATCGCGAGCCTGTGCCTGGTGGTGGCGCTTTTGGCGCTCCTCTGCCACCTGCGCAAGAA
GCAGGGCGCCGCCAGGGCCAAGATGGAGTACAAGTGCGCGGCCCTTCCAAGGAGGTAGTGCTGCAG
CACGTGCGGACCGAGCGGACGCCGAGAGACTCTGAGCGGCCTCCGTCCAGGAGCCTGGCTCCGTCCA
GGAGCCTGTGCCTCCTCACCCCCAGCTTTGCTACCAAAGCACCTTAGCTGGCATTACAGCTGGAGAAG
ACCCTCCCCGCACCCCCCAAGCTGTTTTCTTCTATTCCATGGCTAACTGGCGAGGGGGTGATTAGAGGG
AGGAGAATGAGCCTCGGCCTCTTCCGTGACGTCACTGGACCACTGGGCAATGATGGCAATTTTGTAAAC
GAAGACACAGACTGCGATTTGTCCCAGGTCTCACTACCGGGCGCAGGAGGGTGAGCGTTATTGGTCG
GCAGCCTTCTGGGCAGACCTTGACCTCGTGGGCTAGGGATGACTAAAATATTTATTTTTTTAAGTATT
TAGGTTTTTTGTTTGTTCCTTTGTTCTTACCTGTATGTCTCCAGTATCCACTTTGCACAGCTCTCCGGTCT
CTCTCTCTACAAACTCCCACTTGTATGTGACAGGTAAACTATCTTGGTGAATTTTTTTTCTAGCC
CTCTCACATTTATGAAGCAAGCCCCACTTATCCCCATTCTTCTAGTTTTTCTCTCCAGGAAGTGGG
CAACTACCTGAGTCACCCCTACCTGTGCCTGACCCTACTTCTTTTGTCTTTAGCTGTCTGCTCAGACAG
AACCCTACATGAAACAGAAACAAAAACACTAAAAATAAAAAATGGCCATTGCTTTTTTACCAGATTT
GCTAATTTATCCTGAAATTTAGATTCCCAGAGCAAAATAATTTTAAACAAAGGTTGAGATGTAAAG
GTATTAAATGATGTTGCTGGACTGTCATAGAAATTACACCCAAAGAGGTATTTATCTTTACTTTTAAA
CAGTGAGCCTGAATTTTGTGCTGTTTTGATTTGTACTGAAAAATGGTAATTGTTGCTAATCTTCTTATG
CAATTTCTTTTTTTGTTATTATTACTTATTTTTTGACAGTGTTGAAAATGTTTCAAGAGGTTGCTCTAGATT
GAGAGAAGAGACAAACACCTCCCAGGAGACAGTTCAAGAAAGCTTCAAAGTGCATGA
TTCATGCCAATTAGCAATTGACTGTCACTGTTCCCTGTCACTGGTAGACCAAAATAAAACCAGCTCTAC
TGGTCTTGTGGAATTGGGAGCTTGGGAATGGATCCTGGAGGATGCCCAATTAGGGCCTAGCCCTTAATC
AGGTCTCTCAGAGAATTTCTACCATTTAGAGAGGCTTTTGGGAATGTGGCCCTGAACAAGAATTGGA
AGCTGCCCTGCCCATGGGAGCTGGTTAGAAATGCAGAATCCTAGGCTCCACCCCATCCAGTTCATGAG
AATCTATATTTAACAAGATCTGCAGGGGGTGTGTCTGCTCAGTAATTTGAGGACAACCATTCAGACT
GCTTCCAATTTTCTGGAATACATGAAATATAGATCAGTTATAAGTAGCAGGCCAAGTCAGGCCCTTATT
TTCAAGAAACTGAGGAATTTTCTTTGTGTAGCTTTGCTCTTTGGTAGAAAAGGCTAGGTACACAGCTCT
AGACACTGCCACACAGGGTCTGCAAGGTCTTTGGTTTCAAGCTAGGAATGAAATCCTGCTTCAGT

GTATGGAAATAAATGTATCATAGAAATGTAACCTTTGTAAGACAAAGGTTTTCCTCTTCTATTTTGTA
ACTCAAAATATTTGTACATAGTTATTTATTTATTGGAGATAATCTAGAACACAGGCAAAATCCTTGCTT
ATGACATCACTTGTACAAATAAACAAATAACAATGTGAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAA

FIG. 7A